Ecological Risk Assessment

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What is Ecological Risk Assessment?

- A scientific way to evaluate whether site-related chemicals may be harming local plants or animals

- Typically focused on protecting a local population of organisms, although may address individuals if they are considered threatened or endangered (T&E) species

Types of Ecological Risk Assessment

- Screening Level ERA
  - a quick and conservative evaluation to identify which sites clearly don't pose a risk, those that may have a high risk, and those in the middle
- Baseline ERA
  - uses a more site-specific approach to better evaluate the actual risks at a site. Done only for sites that "fail" the screening level assessment

Woodlands and Riparian Habitat

Basic Steps of Ecological Risk Assessment

- Hazard Identification
  - Collection and review of data from a site
- Exposure Assessment
  - What organisms are present and how are they being exposed to site chemicals?
- Toxicity Assessment
  - What effects are caused by the chemicals?
- Risk Characterization

Hazard Identification

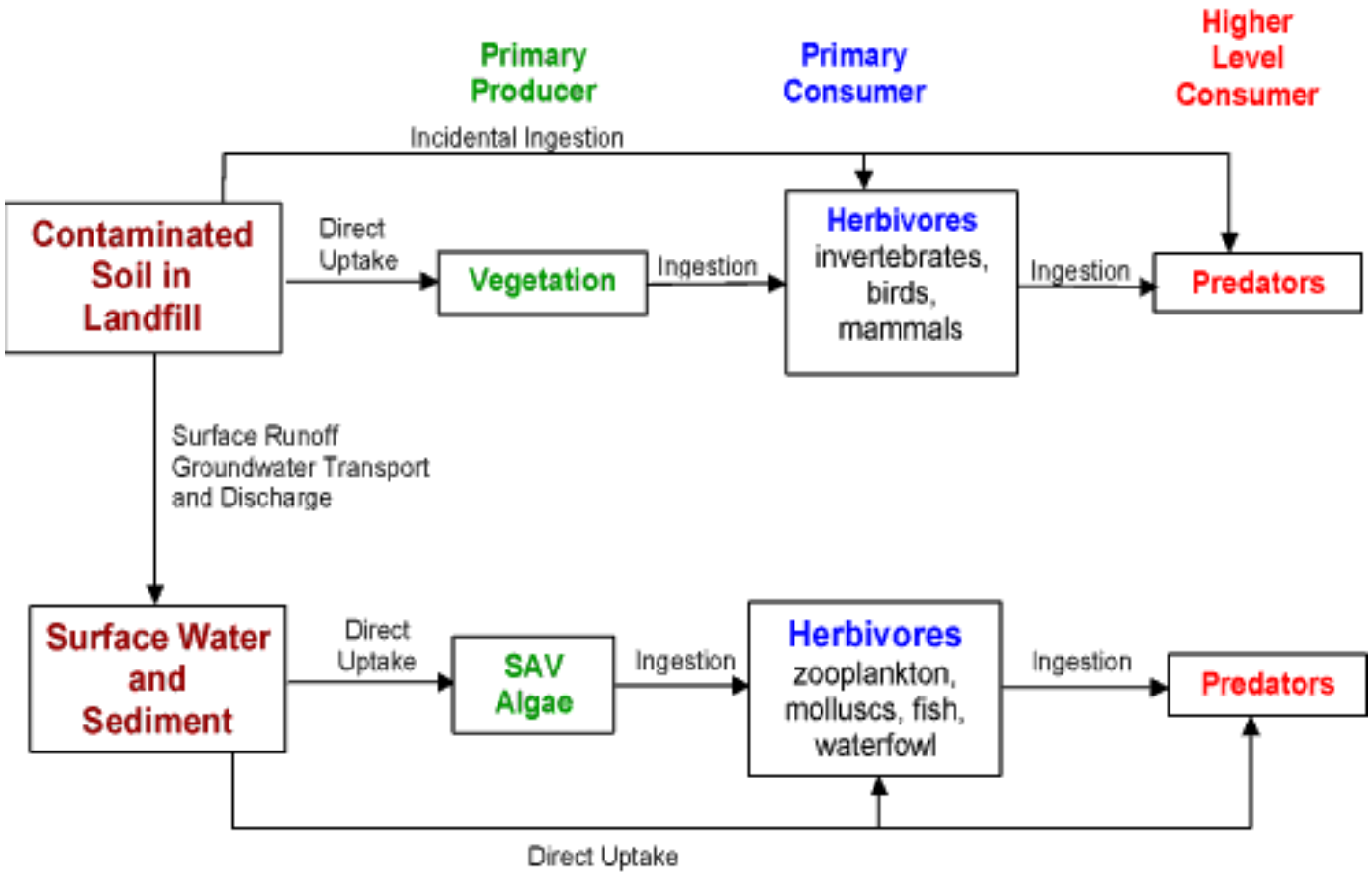
- What chemicals are present?
- Where are they located?
- Are they moving (e.g., contaminated soil being washed into a stream)?
- Screening of data to select “Chemicals of Potential Ecological Concern” (COPECs) for further evaluation

Exposure Assessment

- Development of Conceptual Exposure Model and Food Web
- What plants and animals are present at the site?
- Is there any highly valued habitat present?
- Which are the best “indicator species”?
- How are they exposed to site chemicals?

Collecting Aquatic Organisms

Conceptual Exposure Model



Toxicity Assessment

- Toxicity endpoints are often focused on reproduction and development, to protect the population of organisms
- May consider more sensitive toxicity endpoints, such as body weight changes or fur loss, for T&E Species
- Often have to extrapolate toxicity values between groups of organisms

Risk Characterization

- Combines findings from previous 3 steps to produce a numerical estimate of risk
- Often presented as the “hazard quotient” (HQ) for a single chemical and a “hazard index” (HI) for multiple chemicals
- Overall the ERA is intended to be conservative, but there are many unknowns and uncertainties in the process

Desert and River Habitat

What makes a risk assessment “site-specific?”

- More accurate exposure parameters
- Fraction of site as home range
- Quality of site habitat (e.g., as a food source or den site)
- More refined data assessment (e.g., average vs. maximum concentration)
- Food chain evaluation
- May include field studies

Other ERA Terms

- Assessment Endpoints
  - what specific values are we interested in evaluating (and ultimately, protecting) in an ERA? (Often related to protecting the local population of organisms)
- Measurement Endpoints
  - what evaluations or studies need to be done to support the assessment endpoints?

How are the Results of an ERA used?

- To support site risk management decision making
- Identify what chemicals or portions of a site may pose a risk
- Evaluate whether any T&E species are present and may be affected
- Provide input to site cleanup